CLAIMS

1. A method for forming a semiconductor device with increased latch-up immunity, the method comprising the steps of:

providing a semiconductor substrate;

forming a non-dopant region having a non-dopant edge in the semiconductor substrate; and

forming a dopant region having a dopant edge in the semiconductor substrate, wherein said non-dopant region is within the dopant region and said non-dopant edge is aligned in spaced relation away from the dopant edge.

2. The method of claim 1, wherein the step of forming a non-dopant region comprises the steps of:

forming a hybrid photoresist layer on the semiconductor substrate;

patterning the hybrid photoresist layer to form a first opening having a first edge; and

forming said non-dopant region in the semiconductor substrate through the first opening, said non-dopant edge aligned in spaced relation away from the first edge.

3. The method of claim 2, wherein the step of forming a dopant region comprises the steps of:

removing a first portion of the hybrid photoresist layer to form a second opening in the hybrid photoresist layer, wherein a second portion of the hybrid photoresist layer including the first edge remains on the semiconductor substrate; and

forming the dopant region through the second opening, the dopant edge

aligned with the first edge.

4. The method of claim 2, wherein the step of patterning the hybrid photoresist layer to form the first opening comprises exposing the hybrid photoresist through a mask containing a plurality of shapes and developing the hybrid photoresist such that portions of the hybrid photoresist which were exposed to intermediate amounts of exposure are removed.

5. The method of claim 3, wherein the step of removing a first portion of the hybrid photoresist layer to form a second opening in the hybrid photoresist layer comprises blanket exposing and developing the hybrid photoresist.

6. The method of claim 2, wherein the step of forming a non-dopant region comprises angle ion implanting using the first edge as a shadow to form said non-dopant edge in spaced relation away from the first edge.

7. The method of claim 6, wherein the angle ion implanting occurs at an angle from about 86 degrees to about 89 degrees from the semiconductor substrate.

8. The method of claim 1, wherein said non-dopant region is formed under a shallow trench isolation.

9. The method of claim 1, wherein said non-dopant region suppresses diffusion of dopant near the dopant edge.

10. The method of claim 1, wherein said non-dopant region comprises a Group IV element.

11. The method of claim 10, wherein said Group IV element comprises carbon.

12. The method of claim 11, wherein said carbon has a concentration of about 2E20/cm3.

13. The method of claim 1, wherein the dopant region comprises an N type well.

14. The method of claim 13, wherein the N type well comprises phosphorous.

15. The method of claim 1, wherein the dopant region comprises a P type well.

16. The method of claim 15, wherein the P type well comprises boron.

17. The method of claim 1, wherein said non-dopant edge is from about 500 Angstroms to about 1500 Angstroms away from the dopant edge.

18. The method of claim 1, wherein the step of forming a dopant region comprises ion implanting at an angle substantially normal to the semiconductor substrate.

19. The method of claim 2, wherein after the step of patterning the hybrid photoresist layer to form a first opening, forming a second dopant region in the semiconductor substrate through the first opening, the second dopant region having a second dopant edge aligned with the first edge.

20. The method of claim 19, wherein said non-dopant region is within the second dopant region.

21. The method of claim 19, wherein said non-dopant edge is aligned in spaced relation away from the second dopant edge.

22. A structure comprising:

a substrate including a shallow trench isolation;

a dopant region having a first edge under the shallow trench isolation; and

a non-dopant region having a second edge aligned in spaced relation away from the first edge, and wherein said non-dopant region is within the dopant region for suppressing dopant diffusion near the first edge.

23. The structure of claim 22, wherein said non-dopant region is under a portion of the shallow trench isolation.

24. The structure of claim 22, wherein said non-dopant region comprises a Group IV element.

25. The structure of claim 24, wherein said Group IV element comprises carbon.

26. The structure of claim 22, wherein the dopant region comprises an N type well.

27. The structure of claim 26, wherein the N type well comprises phosphorous.

28. The method of claim 22, wherein the dopant region comprises a P type well.

29. The method of claim 28, wherein the P type well comprises boron.

30. The structure of claim 22, further comprising a second dopant region having a second edge aligned with the first edge, and wherein the second dopant region is within the first dopant region.

31. The structure of claim 30, wherein said non-dopant region is within the second dopant region.

32. The structure of claim 22, wherein said second edge is from about 500 Angstroms to about 1500 Angstroms away from said first edge.